Rural and Remote Health
MEDLINE listed
Impact factor .979
FRAME
ARHEN
Wonca
RURAL HEALTH
ISSN 1445-6354
The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy

PROJECT REPORT

# Surgical outreach program in poor rural Nigerian communities

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***Submitted:*** *27 April 2012;* ***Revised:*** *18 September 2012,* ***Published:*** *14 January 2013*

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***Rural and Remote Health*** **13: 2200. (Online) 2013**

**Available: http://www.rrh.org.au**

## ABSTRACT

**Introduction:** The majority of the world's population resides in rural areas without access to basic surgical care. Taraba State in North-Eastern Nigeria consists of rural communities where approximately 90% of the State's population resides.

**Methods:** This was a prospective study of patients whose surgical conditions were treated during surgical outreach program in rural North-Eastern Nigeria communities between February 2008 and July 2009.

**Results:** A total of 802 patients had 903 procedures due to the co-existence of multiple pathologies in 97 patients (12.1%). There were 506 males (63.1%) providing a male to female ratio of 1.7:1. Ages ranged between one month and 91 years (mean 35.2±18.8 SD). Hernia repair 404 (44.7%), hydrocelectomy±orchidectomy 133 (14.7%), lumps excision 143 (15.8%) and appendicectomy 66 (7.3%) were the most frequent procedures. The surgical conditions were frequently long in duration and huge in size. The duration of goitres ranged from 2 to 28 years (10.3±7.4) and 4 to 42 years (15±13.9) in patients with cleft lip and palate. The procedures were performed under spinal, general and local anaesthesia in 7.6%, 34.3% and 58.2% of patients, respectively. No mortality was recorded but the complications encountered included: surgical site infection 46 (5.1%), scrotal haematoma and oedema 6 (0.7%), haemorrhage 3 (0.3%) and partial wound dehiscence 3 (0.3%).

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Rural-and-Remote-Health
The International Electronic Journal of Rural and Remote Health Research, Education Practice and Policy

**Conclusion:** Surgical pathologies in rural communities are often multiple, wide ranging and of long duration. Such conditions can be successfully managed under local or spinal anaesthesia. Based on the authors' experience, a remarkable reduction in surgical disease burden is feasible in these communities using available, simple but effective options.

**Key words:** developing nations, healthcare access, North-east Nigeria, rural surgery, surgical outreach.

# Introduction

Surgically amenable conditions' substantial contribution to the global burden of disease makes access to surgery indispensable to realising the UN's Millennium Development Goals[1]. Conditions for which surgical interventions prevent major disability or death are expected to rise[2]. It is estimated that approximately 11% of the global disease burden that consists of miscellaneous but treatable surgical conditions is often neglected[3,4]. Most of those bearing this disease burden reside in poor rural communities with depressed infrastructure[3,5]. Inadequate surgical access leads to preventable disability and death in these communities[6].

Financial deprivation and social barriers often impede the access of rural populations to urban healthcare services[4]. Meeting their surgical needs requires an equitable healthcare delivery system that eliminates prevailing barriers. Roads in very poor condition, long travel distances, lack of basic infrastructure, underutilisation of available resources and poor organisation are barriers that make rural patients likely to present late with advanced disease or to fall victim to 'quacks'[1,3].

The provision of surgical services in the locality of rural dwellers reduces inconvenience and expense, and overcomes several barriers to accessing care[7]. An account is presented of such a service offered through an outreach program conducted over 14 weeks among the rural populace of North-Eastern Nigeria.

# Methods

### *Location and funding*

This prospective study was conducted between February 2008 and July 2009 in rural Taraba State, North-Eastern Nigeria, where approximately 90% of the State's population resides. Patients were treated for surgical conditions at 11 different locations during a 14 week surgical outreach program sponsored by the TY Danjuma Foundation in collaboration with Pro Health International (PHI). Pro Health International, a non-governmental organisation usually partners with state and local governments, private organizations or individuals for sponsorship of such outreach programs. While PHI provides the personnel, equipment and medical consumables, the partnering body provides the funds and health facility to be used. The surgical care is provided at no cost to patients.

### *Program description*

The programs were conducted in 11 general or district hospitals in the community. The communities were informed of the outreach by radio broadcast and pre-outreach visits paid to the community leaders. During the pre- outreach visits, personnel from assigned health facilities and local volunteers were educated on what would be required of them and how to perform their duties. An outreach session from 08.00 to 17.00 daily was available for 7-14 days at a particular location. The first days of every outreach were dedicated to the familiarisation of local and visiting teams, set up, further training of staff, and patient screening.

The visiting team consisted of specialist doctors, general-duty doctors, nurses, laboratory scientists, anaesthetists and students drawn from a pool of verified volunteers who were constantly available to the program. The team was usually accommodated in a location within 2 hours road travel of the designated project hospital. Overall team activities were co-

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ordinated from a regional headquarters camp located in the state capital at PHI national headquarters.

In the days penultimate to team departure only minor procedures were performed, and after the program intervention the logistics unit of the visiting team usually remained for 4-5 days in the community to treat patients who had post-surgical complications. The trained local personnel were instructed about the identification and appropriate referral of those with long-term complications.

### *Patients*

Patients were screened by a doctor on the day before their operation for the following investigations, and to obtain informed consent. All patients had a haemoglobin estimation and urinalysis. Investigations such as ultrasonography, blood grouping and electrolyte measurement were performed selectively. Where required, blood was pre-screened and crossed-matched locally from consented donors (usually the patients' relatives).

### *Study data*

For this report, patients' biodata, diagnosis, duration of symptoms, investigation results, interventions performed and outcomes were prospectively collated and analysed using Epi Info v3.5.1 (www.cdc.gov/epiinfo/).

## Results

A total of 802 patients had 903 surgical procedures. Their ages ranged from one month to 91 years (mean 35.2±18.8 SD) and 506 (63.1%) were male (male : female ratio=1.7:1). Those aged 16 years or younger were 152 (19.0%), while those aged 60 years and older were 106 (13.2%; Fig1). The patients were mainly farmers, traders, artisans or unemployed.

The duration of surgical pathologies in the patients were long and they frequently presented with huge-sized lesions. The duration of goitres and cleft lips/palates ranged from 2 to 28 years (10.3±7.4) and 4 to 42 years (15±13.9), respectively. Hernia repair 404 (44.7%), hydrocelectomy ± orchidectomy 133 (14.7%), lump excisions 143 (15.8%) and appendicectomy 66 (7.3%) were the most frequent procedures performed (Table 1). Among the emergency procedures performed were 19 Caesarean sections ± uterine repair (2.1%), 11 laparotomies (1.2%) and 5 evacuation of retained products of conception (ERPC; 0.6%) . Multiple surgical conditions were noted in 97 patients (12.1%; Table 2).

The procedures were performed under spinal, general and local anaesthesia (LA) in 7.6%, 34.3% and 58.2% of patients, respectively. Complications included 46 surgical site infections (5.1%), 6 cases of scrotal haematoma and oedema (0.7%), and 3 patients each for haemorrhage (0.3%) and partial wound dehiscence (0.3%).

## Discussion

Nigeria is the most populous Black nation with a population of 140 million. According to the 2006 census the majority of this population resides in a rural area. Health care is provided in Nigeria by both private and public hospitals with over 80% located in the metropolitan area[8]. Public healthcare services are concurrently provided at tertiary, secondary and primary levels by federal, state and local governments, respectively[9]. The provision of surgical services at the district level is mainly from individual state government secondary hospitals because the local government-run Primary Health Centres (PHC) are staffed by paramedics and focus on preventive care[9].

Taraba State has a predominantly rural population (11.6% of population in the four major towns) located within the mountain ranges that border the Cameroon Republic in North-Eastern Nigeria. It has a population of 2.3 million, a land mass of 54 473 km$^2$, population density of 27.2/km$^2$ and annual growth rate of 3.1%, according to the 2006 census. The state's two tertiary hospitals (Federal Medical Centre and Specialist Hospital) are located in the capital Jalingo.

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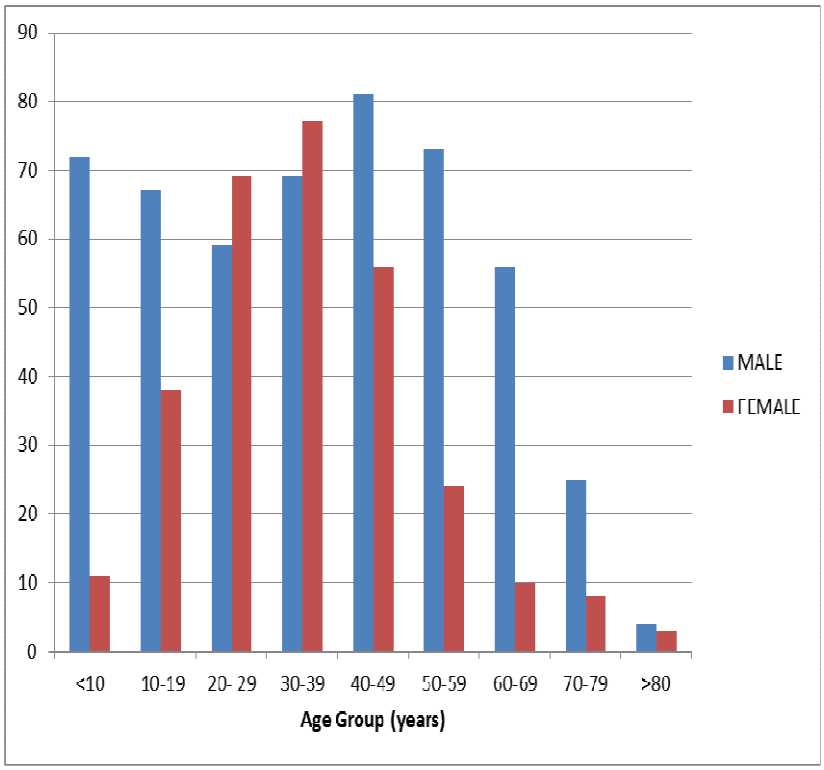


**Figure 1: Patients' age group and gender distribution.**

At the time of this report, there were only 22 doctors in the Taraba State health service, covering its 14 public hospitals including the Specialist Hospital in the state capital.

This is a common scenario in rural low-income nations and fails to meet the WHO recommendation of one doctor for 1000 inhabitants per annum. Globally, only approximately 3.5% of the estimated 234.2 million major surgical procedures performed each year occur in resource-poor nations; however, 73.6% occur in wealthy nations that represent only 30% of the world's population[10].

During the rural surgical outreach reported, a total of 802 patients received an operation; however, due to the presence of multiple surgical conditions in 97 patients (12.1%), 903 procedures were performed. The diverse surgical conditions treated ranged from hernias to hydroceles, congenital anomalies, goitres, lumps, injuries and obstetric complications. A successful rural surgeon must therefore have wide surgical experience and be able to respond to life-threatening emergencies.

Patients aged 20-40 years constituted 328 (40.9%) of the group treated. Among these young adults it is estimated that unaddressed surgical conditions would cause 20% of deaths and 10% overall deaths[5]. Those aged 60 years and older comprised 106 (13.2%) of the group treated. Elderly people comprise a large and increasing proportion of rural dwellers, are impoverished and can be expected to increase surgical demands and hospital admissions in the near future[11,12]. If unaddressed, old-age-related deaths can be expected to account for 75% of future mortality in low-resource nations[12].

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**Table 1: Spectrum of surgical procedures performed in the outreach**

| Procedure | Frequency *n* (%) |
|---|---|
| Hernia repair | 404 (44.7) |
| Hydrcecectomy ± orchidectomy | 133 (14.7) |
| Lipoma excision | 92 (10.2) |
| Appendicectomy | 66 (7.3) |
| Lumpectomy† | 51 (5.6) |
| Myomectomy | 38 (4.2) |
| Thyroidectomy | 16 (1.8) |
| Caesarean section ± BTL | 17 (1.9) |
| Ganglionectomy | 13 (1.4) |
| Hysterectomy | 12 (1.3) |
| Ovarian cystectomy | 11 (1.2) |
| Laparotomy | 11 (1.2) |
| Cleft repair | 7 (0.8) |
| Orchidopexy | 7 (0.8 ) |
| ERPC | 5 (4) |
| Colpoperinerraphy | 3 (0.3) |
| Fracture reduction & POP application | 2 (0.2) |
| Uterine repair & BTL | 2 (0.2) |
| Suprapubic cystostomy | 2 (0.2) |
| Circumcision | 2 (0.2) |
| Retrival of foreign body | 1 (0.1) |
| Zadek operation | 1 (0.1) |
| Amputation | 1 (0.1) |
| Others | 2 (0.2) |
| Total | 903 (100) |

BTL, Bilateral tubal ligation; ERPC, evacuation of retained products of conception; POP, plaster of paris.
†Includes breast, keloids, dermoid and sebaceous lumps

**Table 2: Number of patients and surgical pathologies treated in the outreach**

| Diagnosis | Patients | Procedures |
|---|---|---|
| Multiple hernia | 32 | 64 |
| Hydrocele and hernia ±lumps | 18 | 37 |
| Bilateral hydroceles | 12 | 24 |
| Multiple lumps | 6 | 12 |
| Hernia and lumps | 6 | 12 |
| Appendicitis and lumps | 6 | 12 |
| Appendicitis and hernia† | 3 | 6 |
| Multiple hernia and hydrocele | 2 | 6 |
| Multiple ganglion | 2 | 4 |
| Bilateral undescended testis | 2 | 4 |
| Bilateral ovarian cyst | 2 | 4 |
| Others | 6 | 13 |
| Total | 97 | 198 |

†Excludes Amyand hernia.

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Children are not exempt from low rural access to surgical care and represented 152 (16.8%) of the treated group. Uncorrected childhood surgical conditions such as cleft lip/palate may stigmatise a child at crucial periods in their lives, and the children of poor, rural households are also vulnerable to severe malnutrition, a greater disease gradient, erratic immunisation and high mortality, as reported from Uganda[13].

The patients reported here were mainly subsistence farmers, traders, artisans or unemployed and this reflects the low socio-economic status of the rural population, who also lack reliable health insurance. In a previous survey only approximately 4% of rural respondents had their medical expenses covered by their employers[8]. Rather than merely focusing on the technical aspects of surgery, rural health care must be comprehensively delivered to meet cultural values, and social needs and expectations, all of which are strong factors influencing treatment compliance and patients' health-seeking behaviour[3,14].

Hernia, the most common condition treated, is highly prevalent in resource-low nations due to poverty. In Africa, the yearly incidence of hernia reaches approximately 175 per 100 000 but only approximately 14.3% of inguinal hernias are repaired, despite the demonstrated benefits of elective hernia repair in reducing mortality and morbidity from bowel obstruction, strangulation and fistulation[15]. Few rural dwellers are able to take time off work for hernia repair at a distant hospital[16]. Likewise, hydrocele is the most common clinical manifestation of lymphatic filariasis in males; the majority of the over 120 million people affected live in poor, rural nations and suffer severe disability and dysfunction[9]. Due to a lack of surgical treatment, rural dwellers risk bacterial infection, infertility, hepatitis, HIV and the recurrence of symptoms following treatment by traditional healers.

Appendicitis, the most common acute abdominal surgical condition, involves increased morbidity, cost and hospital stay when complicated. The perforation rate is higher among rural than urban patients due to a delay in accessing care in urban centres and from inter-hospital transfer[17]. Prompt surgical intervention reduces both the mortality of appendicitis and the risk of perforation following non-operative treatment[18].

Emergencies and treatment of surgical complications constitute the bulk of surgical activity in developing nations[18]. The surgeons in this report performed 94 emergency procedures (10.4%), including acute abdomen from bowel obstruction, acute appendicitis, prolonged obstructed labour, injuries and septic complications. Without surgical and obstetrical services, approximately 10% of the population die from injury, and 5% of pregnancies result in maternal death[5]. Vesico-vaginal fistula (VVF), a devastating condition that leads to social isolation, marital disharmony, divorce and severe psychological trauma following prolonged, obstructed labour in developing nations is worse among rural patients due to unsupervised or poorly supervised home delivery and delayed referrals by 'quacks'[19]. The misery of VVF is compounded by distressing morbidities such as rectovaginal fistula, foot drop, anaemia, pelvic infection and infertility. While simple cases could be repaired effectively by trained general or gynecological surgeons, the skills and experience of expert fistula surgeons are required for complex cases. Staged operations for such complex fistulas were avoided by the careful patient selection of a fistula surgeon[19]. Ruptured uterus in two grand-multipara, managed with uterine repair and bilateral tubal ligation, is a marker for lack of preventive health services and essential services in the community. Sadly, the number of rural women who die without reaching urban facilities is usually unquantified.

The surgical conditions observed in these rural communities were very large in size and frequently of long duration. The mean duration of 10.3 years for goitre (range 2-28 years) and 15 years for cleft lip/palate (range 4-42 years) are markers of the long waiting times for surgery. Huge hydroceles with gross testicular pressure atrophy warranted hydrocelectomy with orchidectomy in seven patients. Beside the higher mortality from surgical complications, large hydroceles carry the risk of impotence and infertility. Other large lesions included hernia, fibroids, and lumps that interfered with normal life, employment and/or mobility (Figs 2,3).

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**Figure 2: Preoperative gross umbilical hernia in a 32 year old woman.**

**Figure 3: The woman after surgical repair of the gross umbilical hernia.**

Anaesthesia remains a major constraint to the provision of essential surgical services in resource-low nations due to shortages of trained personnel, equipment, supplies and sub-optimal drug storage facilities[20]. During surgical outreaches, pre-operative anaesthesia assessment must employ skilled clinical judgement to ensure patient safety[21] . The surgeons in this project relied on LA and spinal anaesthesia for surgical procedures in 65.8% of patients. Local anaesthesia was utilised in hernia repair, hydrocelectomy, excision of lumps and thyroidectomy in 58.2% of patients, while spinal anaesthesia was used in the 7.6% of patients who had lower abdominal, limb or cutaneous lesions where LA was not feasible. Both anaesthetic techniques are cheap and effective methods that require less rigorous monitoring. Hence, in

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low-income countries where anaesthetic drugs and resources are scarce, much surgical morbidity and mortality could be prevented using these simple but safe approaches[20].

As is shown in this report, a surgical specialist outreach program can fast track the provision of surgical care to a large number of patients and overcome obstacles to quality health care at the district level. In rural, low-income nations with mid-level surgical care providers or non-specialists keen for surgical experience, such a program also provides an opportunity to improve the skills and knowledge of local surgeons. For this reason local surgeons, nurses, paramedics, and students from district hospitals were include in the outreaches. An outreach also accomplishes more with personnel proficient in dealing with local disease conditions, and who are accustomed to the culture, beliefs and traditions of the local community. Finally, the transmission of surgical expertise and knowledge in this way integrates protocols for effective and appropriate patient follow up.

# Conclusion

In low-resource rural communities, the wide spectrum of frequently multiple and long-standing surgical conditions can be treated successfully using the focused approach described in this report. Where anaesthetists are not readily available, much can still be achieved under LA. A remarkable reduction in the surgical disease burden in these rural communities is feasible with well-organised surgical outreaches that also strengthen local capacity. Collective responses and the unanimous actions of both surgeons and health policy-makers can make this expertise more widely available to assist in establishing crucial, self-sustaining and autonomous surgical rural health care.

# References

1. Kushner AL, Cherian MN, Noel L, Spiegel DA, Groth S, Etienne C. Addressing the Millennium Development Goals from a surgical perspective: essential surgery and anesthesia in 8 low- and middle-income countries. *Archives of Surgery* 2010; 145(2): 154-159.

2. Ozgediz D, Jamison D, Cherian M, McQueen K. The burden of surgical conditions and access to surgical care in low and middle income countries. *Bulletin of the World Health Organisation* 2008; 86(8): 646-647.

3. Grimes CE, Bowman KG, Dodgion CM. Systematic Review of Barriers to Surgical Care in Low-Income and Middle-Income Countries. *World Journal of Surgery* 2011; 35(5): 941-950.

4. Debas H, Gosselin R, McCord C, Thind A. Surgery. In: DT Jamison, JG Breman, AR Measham, G Alleyne, M Claeson, DB Evans et al (Eds). *Disease control priorities in developing countries*, 2nd edn. New York: Oxford University Press, 2006.

5. Atiyeh BS, Gunn SWA, Hayek SN. Provision of Essential Surgery in Remote and Rural Areas of Developed as well as Low and Middle Income Countries. *International Journal of Surgery* 2010; 8(8): 581-585.

6. Galukande M, von Schreeb J, Wladis A, Mbembati N, de Miranda H et al. Essential Surgery at the District Hospital: A Retrospective Descriptive Analysis in Three African Countries. *PLoS Medicine* 2010; 7(3): e1000243.

7. Prabhu RD. Rural Surgery: An Editorial. *Indian Journal of Surgery* 2003; 65(1): 22-23.

8. Ogunbekun I, Ogunbekun A, Orobaton N. Private Health Care in Nigeria: Walking the Tightrope. *Health Policy and Planning* 1999; 14(2): 174-181.

9. Thomas G, Richards FO Jr, Eigege A, Dakum NK, Azzuwut MP, Sarki J et al. A Pilot Program of Mass Surgery Weeks for Treatment of Hydrocele Due to Lymphatic Filariasis in Central Nigeria. *American Journal of Tropical Medicine and Hygiene* 2009; 80(3): 447-451.

10. Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz SR, Berry WR et al. An Estimation of the Global Volume of Surgery: a Modelling Strategy Based on Available Data. *Lancet* 2008; 372: 90-92.

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11. Lynge DC, Morris NW, Hunter JG. Acute Care Surgery in the Rural Setting: In: LD Britt, DD Trunkey, DV Feliciano (Eds); *Acute Care Surgery Principles and Practice*. New York: Springer, 2007; 94-201.

12. McLigeyo SO. Editorial - Ageing Population in Africa and Other Developing Communities: A Public Health Challenge Calling for Urgent Solutions. *East African Medical Journal* 2002; 79: 281-283.

13. Kiwanuka SN, Ekirapa EK, Peterson S, Okui O, Rahman MH, Peters D et al. Access to and utilisation of health services for the poor in Uganda: a systematic review of available evidence. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 2008; 102(11): 1067-1074.

14. Awoyemi TT, Obayelu OA, Opaluwa HI. Effect of Distance on Utilization of Health Care Services in Rural Kogi State, Nigeria. *Journal of Human Ecology* 2011; 35(1): 1-9.

15. Kingsnorth AN, Oppong C, Akoh J, Stephenson B, Simmermacher R. Operation Hernia to Ghana. *Hernia* 2006; 10: 376-379.

16. McConkey SJ. Case Series of Acute Abdominal Surgery in Rural Sierra Leone. *World Journal of Surgery* 2002; 26: 509-513.

17. Paquette IM, Zuckerman R, Finlayson SR. Appendicitis Among Rural and Urban Patients: Implications of Access to Care. *Annals of Surgery* 2011; 253(3): 534-538.

18. Archampong EQ. Surgery in developing nations. *British Journal of Surgery* 2006; 93(5): 516-517.

19. Umoiyoho AJ, Inyang-Etoh EC, Etukumana EA. Obstetric Fistula Repair: Experience with Hospital-Based Outreach Approach in Nigeria. *Global Journal of Health Science* 2012; 4(5): 40-45.

20. Bosenberg AT. Pediatric anesthesia in developing countries. *Current Opinionin Anaesthesiology* 2007; 20: 204-210.

21. Eguma SA. Participation in a Medical Mission: the Nigerian Experience. *World Anaesthesia News* 2002; 6(1): 9-10.

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